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(54) Destruction of microorganisms by electrical means

(57) An apparatus has a box A containing a generator producing a high direct voltage between its positive pole B and its negative pole C. The negative pole C is connected to a probe terminating in one or more sharp needles or conductive fibres, producing a high-gradient electric field and negative air ions for application to or near a surface contaminated with microorganisms to destroy them.

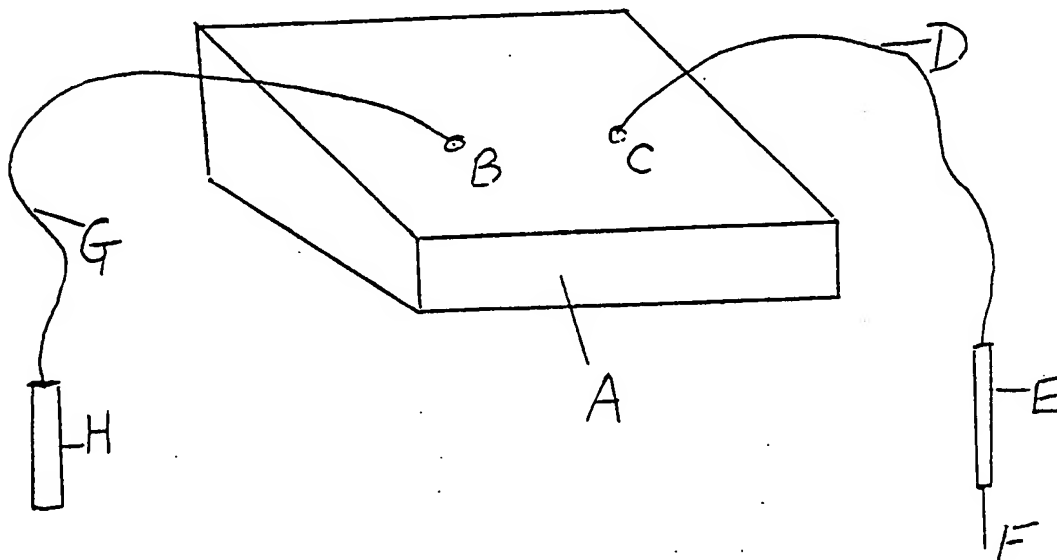


FIGURE 1

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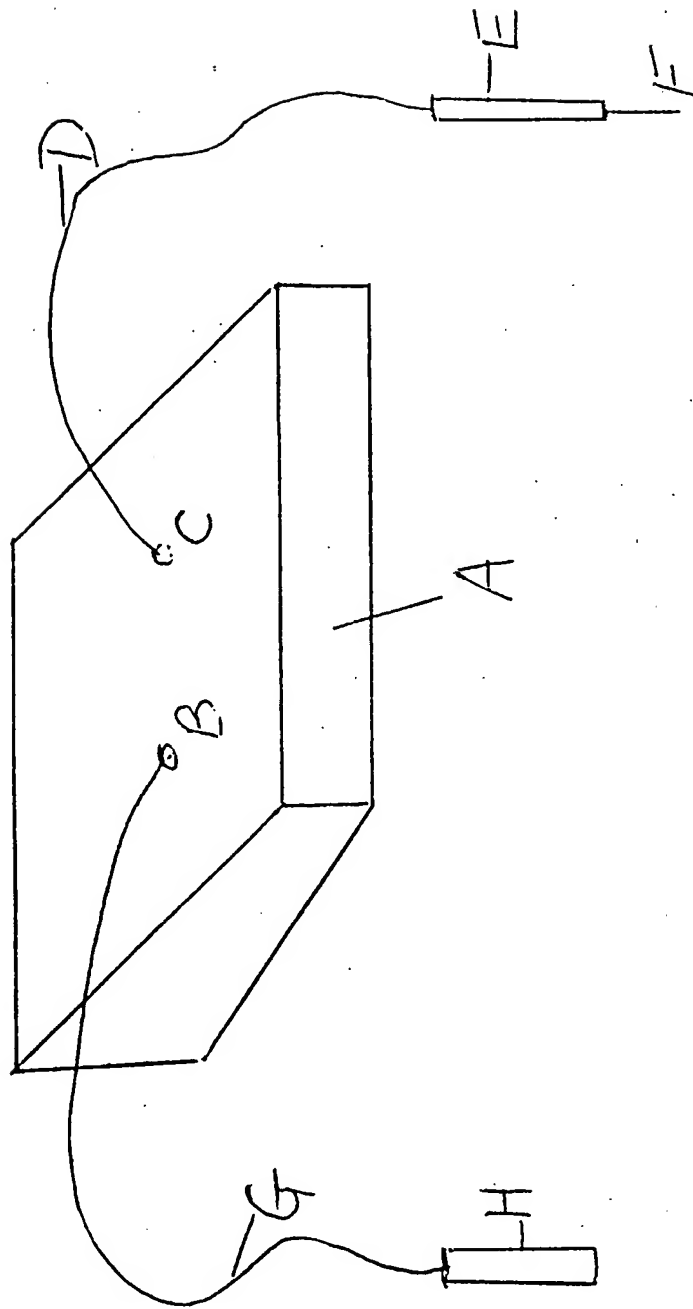


FIGURE 1

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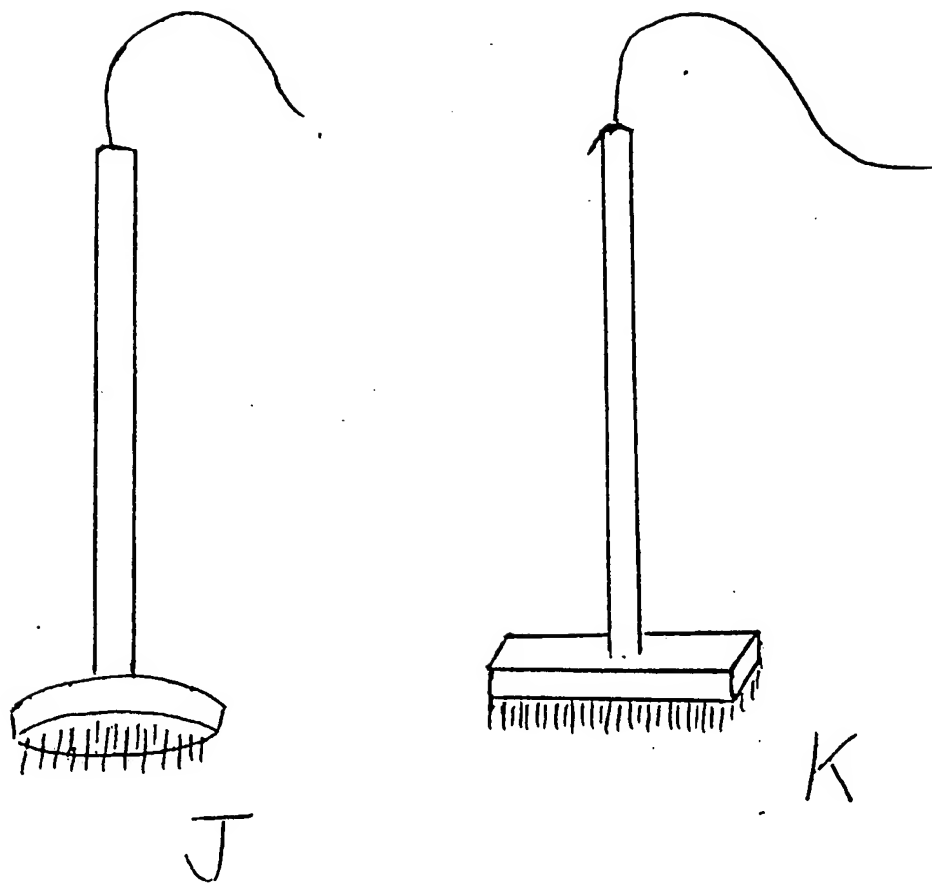


FIGURE 2

$$\frac{3}{3}$$

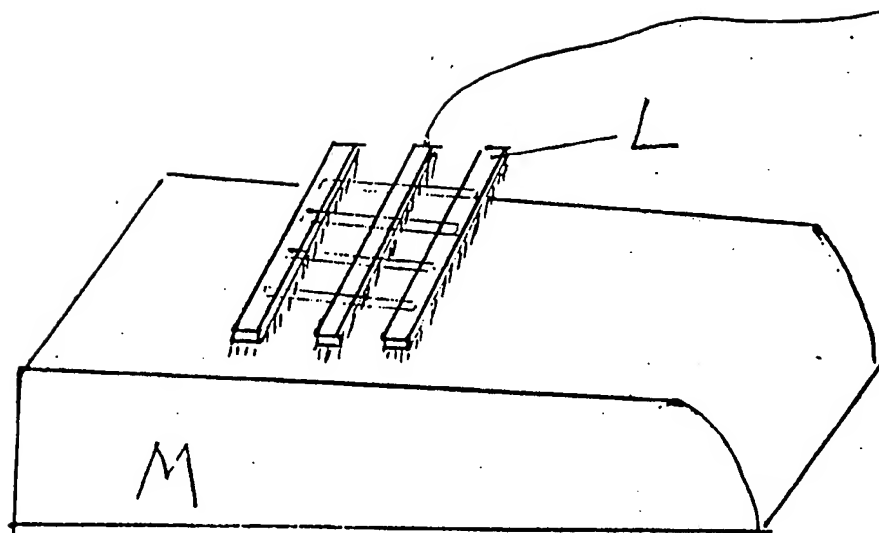


FIGURE 3

DESTRUCTION OF MICROORGANISMS

This invention refers to an apparatus for destroying microorganisms by electrical means.

Many problems in medicine, dentistry and food preservation are caused by microorganisms. Bacteria cause dental caries; fungi cause diseases such as Athlete's Foot; bacteria and fungi cause food to decay. Implements like medical, surgical and dental instruments and surfaces in areas such as operating theatres and surgeries can be a means of passing on infections if they become contaminated with microorganisms.

Traditional solutions to these problems suffer from certain drawbacks. Bacteria in dental cavities can be destroyed by chemicals such as sodium hypochlorite, but this is toxic and irritant to soft tissue. Topical fungal infections of the skin can also be treated by chemical means, but the process is often messy and less than totally effective, owing mainly to the difficulty of ensuring that the chemical comes into contact with all the microorganisms involved, even in folds of the skin. The same difficulties of penetration on a microscopic level limit the effectiveness of disinfectants to maintain the sterility of surfaces in surgeries and similar places. Medical and dental instruments can be sterilised by steam, dry heat or chemical means, but can later become contaminated with microorganisms during storage unless sealed in special packs, which are expensive. Food can be preserved by treating it with chemicals or with ionising radiation, but these methods are unpopular with the public.

I have found that microorganisms can be killed by bombarding them with negative air ions in a high-gradient electric field, and have invented apparatus for achieving this. This method of destruction suffers from none of the above disadvantages.

One example of such apparatus, for dental or medical use, is illustrated in the accompanying diagrams.

In Figure 1, a box A contains a generator (which may incorporate current-limiting devices) producing a high direct voltage (say 10,000 volts) between its positive pole B and its negative pole C. The negative pole is connected via a wire D to a probe E which terminates in a sharp needle F. The positive pole B is connected via a wire G either to a pipe-shaped electrode H, which may be held in the patient's hand, or to an electrical earth.

In use the tip of the needle is pointed by the doctor or dentist at the site of bacterial infection or fungal infestation while the negative air ions are repelled from the needle and attracted to the site of application across the intervening high-gradient electric field, destroying the microorganisms in the way.

The apparatus can be modified to treat larger areas by replacing the single needle with a multi-point probe of some such design as J in Figure 2 or a brush of conductive fibres such as that shown at K in Figure 2. Larger applicators like the one marked L in Figure 3 can be suspended over stationary or moving beds like that marked M in Figure 3 carrying fruit or vegetables which can be tumbled as they pass underneath. A similar applicator and stationary bed may be incorporated into a storage system for medical, surgical or dental instruments.

CLAIMS

- 1 An apparatus consisting of a generator producing a high direct voltage, the negative pole of which is connected to a sharp-pointed conductor for application to or near a surface contaminated with microorganisms to destroy them.
- 2 An apparatus similar to that described in Claim 1 but with a clip connected to its positive pole for attachment to an electrical earth.
- 3 An apparatus similar to that described in Claim 1 but with an electrode connected to its positive pole for a patient to hold in the hand.
- 4 An apparatus similar to that described in any of the foregoing Claims but with its negative pole connected to a multi-point electrode.
- 5 An apparatus similar to that described in Claim 1 but with its positive pole connected to a conductive bed and its negative pole connected to a multi-point electrode.
- 6 An apparatus similar to that described in any of the above claims but incorporating means of limiting the current to a safe value.